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**Effect of alfalfa (*Medicago Sativa*) protein concentrate incorporation
on the CIELab color parameters of wheat pasta**

*Efectul încorporării concentratului proteic din lucernă (Medicago sativa)
asupra parametrilor de culoare CIELab ai pastelor făinoase*

The pasta industry represents one of the most dynamic segments of the food sector, owing to its accessibility, versatility, and nutritional value for consumers. In recent decades, consumer preferences have increasingly shifted toward functional and nutritionally enriched food products. Protein concentrate derived from alfalfa

(*Medicago sativa*) is characterized by a high content of proteins, dietary fiber, vitamins, and bioactive compounds, and is therefore considered a promising ingredient for food fortification. The aim of this study was to investigate the effect of incorporating alfalfa protein concentrate, at levels ranging from P0% to P10% (w/w) of flour weight, on the color parameters of dry pasta produced from durum wheat flour. Color measurements were performed using a Konica Minolta CR-400 colorimeter (Tokyo, Japan), and the CIELab parameters were recorded as follows: L* (lightness), a* (red–green coordinate), b* (yellow–blue coordinate), and $-a^*/b^*$ (green index). The results indicated that increasing the proportion of protein concentrate led to a decrease in L* values, reflecting a darker appearance of the pasta samples. Regarding the a* parameter, a progressive shift toward negative values was observed, indicating an intensification of green coloration, from 0.47 (P0%) to -2.62 (P10%), attributable to the presence of chlorophylls in alfalfa. The b* parameter confirmed the presence of a yellow hue, associated with carotenoids naturally occurring in both wheat flour and alfalfa. No statistically significant differences ($p > 0.05$) in the green index were observed between the sample pairs P0% and P2%, P4% and P6%, and P8% and P10%. This finding suggests that chlorophyll pigments were efficiently co-extracted with the protein concentrate, which was precipitated at its isoelectric point. Thus, the results highlight the potential of alfalfa protein concentrate as a functional ingredient in the development of nutritionally enhanced pasta products.

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